

Appl No.: 10/655,986

Reply to Office Action of November 03, 2006

Atty. Dkt. No:

UCF-374

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims**

**Claim 1 (Currently Amended).** Monodispersed, spherical zirconia ( $\text{ZrO}_2$ ) particles of approximately 10 to approximately 600 nm, pure and free of foreign oxides exhibit exhibiting metastable tetragonal crystal structure at room temperature are produced by a sol-gel process comprising the steps of:

- a) mixing zirconium-alkoxide and an alcohol, forming preparation one;
- b) separately dissolving completely de-ionized water and a polymeric steric stabilizer in an alcohol forming preparation two;
- c) mixing the preparation one and the preparation two for approximately a few minutes while subjecting the mixture to hydrolysis and condensation reactions with very slow stirring;
- d) waiting for the formation of a sol from the mixture;
- e) drying at approximately 80 degrees C to form resultant material;
- f) crushing the resultant material; and
- g) forming spherical zirconia ( $\text{ZrO}_2$ ) particles with 100% tetragonal crystal structure having aggregation and loose agglomeration properties.

**Claim 2 (Original).** The  $\text{ZrO}_2$  particles as in claim 1, wherein said particles are approximately 10 to approximately 30 nm.

**Claim 3 (Original).** The  $\text{ZrO}_2$  particles as in claim 1, wherein said particles are approximately 500 to approximately 600 nm.

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Claims 4 - 6 (Canceled).

Claims 7 - 20 (Cancelled).

Claim 21 (Currently Amended). A coating of monodispersed, spherical  $ZrO_2$  particles of Claim 1 on a metal substrate, wherein said particles are approximately 10 to approximately 600 nm in size, are synthesized using a sol-gel technique, are pure and free of foreign oxides, exhibit metastable tetragonal crystal structure and are 100% in the tetragonal phase.

Claim 22 (Cancelled).

Claim 23 (Original). The coating, as in claim 21, wherein said particles are approximately 10 to approximately 30 nm in size.

Claim 24 (Original). The coating, as in claim 21, wherein said particles are approximately 500 to approximately 600 nm in size.

Claim 25 (Currently Amended). Monodispersed, spherical particles of Claim 1 that are approximately 10 to approximately 600 nm, which exhibit metastable tetragonal crystal structure at room temperature, wherein said particles are approximately 100% in the tetragonal state, and are composed of a ceramic oxide, and being composed of a single, pure oxide, which is free of other foreign oxides.

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**Claim 26 (Original).** The monodispersed spherical particles, as in claim 25, wherein said ceramic oxide is selected from the group consisting of zirconium oxide, tin oxide, titanium oxide and indium oxide.

**Claim 27 (Original).** The monodispersed particles, as in claim 25, wherein said particles are of the size approximately 10 to approximately 30 nm.

**Claim 28 (Original).** The monodispersed particles, as in claim 25, wherein said particles are of the size approximately 500 to approximately 600 nm.

**Claims 29 - 30 (Canceled).**

**Claim 31 (New).** A nanocrystalline  $ZrO_2$  powder formed from monodispersed, spherical  $ZrO_2$  particles of Claim 1 wherein the resultant material is small gel pieces that are crushed to obtain the nanocrystalline  $ZrO_2$  powder.